

## AS4600

### Petrol Engine V6 Setting/Locking COMPLETE KIT

**Associated Tool:** AS4614  
Crankshaft Pulley Holding Tool



## Applications:

**ROVER V6 2.0 & 2.5 Quad Cam Petrol engines in**

**ROVER**  
825 45 75

**LAND ROVER**  
Freelander

**Rover KV6 engines**

**Additional AS Tools required:**  
AS4614 Crankshaft Pulley Holding Tool

### Engine Variants & Kit Options:

The Rover KV6 quad cam engine has evolved over a number of years, and the original version in the Rover 825 uses a different timing tools combination than the later engine variants in the Rover 45/75/L-R Freelander models. However some of the timing tools are common to all applications.

**A COMPLETE KIT is available to cover all KV6 models/variants. 2 x MAIN KITS are also available - these cover only specific models/engines.**

- **AS4600 COMPLETE Kit** includes **ALL** tools covering **ALL KV6 engine variants**.
- **AS4605 MAIN KIT** comprises the tools for **Rover 45/75 and L-R Freelander 2.0 & 2.5 engines** (99-)
- **AS4610 MAIN KIT** comprises the tools for **Rover 825 2.5 variant** (-99).

The 2 x Main Kits can subsequently increase their application coverage via

- **AS4615 SUPPLEMENTARY SET** - Increases AS4610 Kit (825) to cover **Rover 45/75 & L-R Freelander**
- **AS4616 SUPPLEMENTARY SET** - Increases AS4605 Kit (45/75/Freelander) to cover **Rover 825**

AS4600 COMPLETE Kit and AS4605 / AS4610 MAIN Kits use an identical case and insert layout where space is provided to also accept the tools from the SUPPLEMENTARY Sets - see Page 2 for Kit contents.

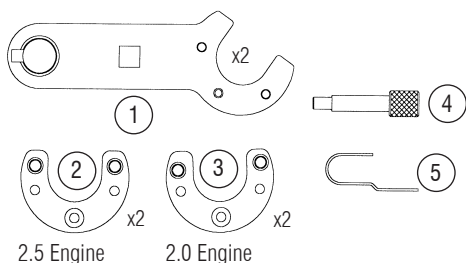
**NOTE: All AST KV6 Kits cover replacement of both front timing belt and rear cam belts.**

### AS4600 Kit contents/spares

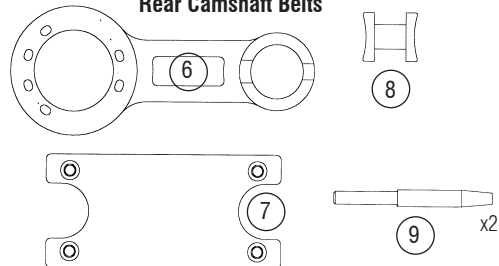
Item	Part Number	Description
Front Timing Belt		
1	AS4601	Camshaft Locking Tool (2 per kit)
2	AS4602	Camshaft Locking Adaptor (2 per kit) SILVER (2.5 engine)
3	AS4603	Camshaft Locking Adaptor (2 per kit) GOLD (2.0 engine)
4	AS4604	Crankshaft Locking Pin
5	AS4360T1	Tensioner Locking Pin
Rear Camshaft Belts		
6	AS4606	Rear Cam Sprockets Setting Tool
7	AS4607	Rear Cam Sprockets Setting Tool
8	AS4608	Rear Cam Sprockets Spreader
9	AS4609	Rear Cam Sprockets Guide Pin (2 per kit)
--	AS4600/84	Case + Insert

**IMPORTANT:** Always refer to the vehicle manufacturer's service instructions, or proprietary manual, to establish the current procedures and data. Product Information Sets detail applications and use of the tools with any general instructions provided as a guide only.

#### Front Timing Belt



#### Rear Camshaft Belts



## AS4600 Range - Kit Options / Applications

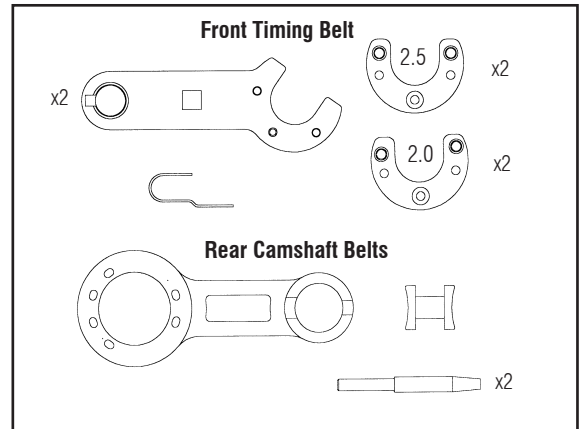
### AS4605 Engine Setting/Locking MAIN KIT

**Applications: Rover 45 & 75**

**Land Rover Freelander**

**2.0 & 2.5 KV6 engines (99-)**

Comprises: AS4601 Camshaft Locking Tool (2 off)  
AS4602 Camshaft Locking Adaptor (2 off)  
AS4603 Camshaft Locking Adaptor (2 off)  
AS4360T1 Tensioner Locking Pin  
AS4606 Rear Cam Sprockets Setting Tool  
AS4608 Rear Cam Sprockets Spreader  
AS4609 Rear Cam Sprockets Guide Pin (2 off)

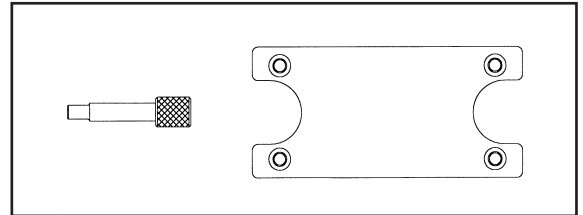


### AS4616 Engine Setting/Locking

#### SUPPLEMENTARY SET

**Applications: Increases AS4605 Main Kit  
to additionally cover Rover 825**

Comprises: AS4604 Crankshaft Locking Pin  
AS4607 Rear Cam Sprockets Setting Tool

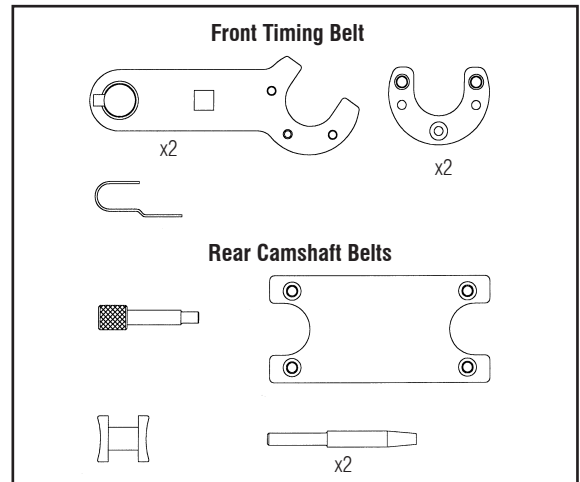


### AS4610 Engine Setting/Locking MAIN KIT

**Applications: Rover 825**

**2.5 KV6 engine (96-99)**

Comprises: AS4601 Camshaft Locking Tool (2 off)  
AS4602 Camshaft Locking Adaptor (2 off)  
AS4360T1 Tensioner Locking Pin  
AS4604 Crankshaft Locking Pin  
AS4607 Rear Cam Sprockets Setting Tool  
AS4608 Rear Cam Sprockets Spreader  
AS4609 Rear Cam Sprockets Guide Pin (2 off)

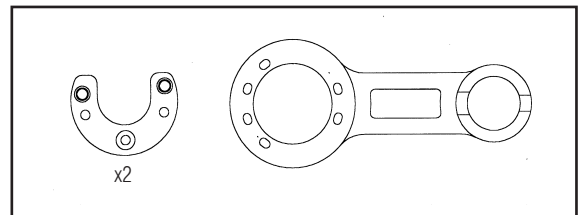


### AS4615 Engine Setting/Locking

#### SUPPLEMENTARY SET

**Applications: Increases AS4610 Main Kit to  
additionally cover Rover 45 / 75  
and L-R Freelander**

Comprises: AS603 Camshaft Locking Adaptor (2 off)  
AS4606 Rear Cam Sprockets Setting Tool



## AS4600 Rover KV6 Engine Setting/Locking COMPLETE Kit

Comprises AS4601 Camshaft Locking Tool (2 off)  
AS4602 Camshaft Locking Adaptor (2 off)  
AS4603 Camshaft Locking Adaptor (2 off)  
AS4604 Crankshaft Locking Pin  
AS4606 Rear Cam Sprockets Setting Tool  
AS4607 Rear Cam Sprockets Setting Tool  
AS4608 Rear Cam Sprockets Spreader  
AS4609 Rear Cam Sprockets Guide Pin (2 off)  
AS4360T1 Tensioner Locking Pin

The AS4600 **COMPLETE Kit** includes all the engine timing belt replacement tools for the 2.0 and 2.5 variants of the KV6 quad cam engine and therefore covers applications on the Rover 825, 45, 75 and Land Rover Freelander.

**MAIN Kits** AS4605 and AS4610 cover these applications as two groups - either 45/75/L-R Freelander or 825 and each kit includes the relevant timing tools from AS4600 Kit to fully cover that application - see Engine Variants / Kit Options on first page.

**NOTE:** The Rover KV6 engines have a front timing belt and two rear camshaft belts and therefore replacement of all 3 belts are covered by the tools in the Kits.

This Product Information details use of the tools required for belt replacement as -

### Section 1 - Front Timing Belt replacement Section 2 - Rear Camshaft Belt replacement

Belt replacement procedures on all KV6 variants are basically the same and this information covers all applications. Most tools are common to all engines but where a tool is required for a specific model/engine variant, it is detailed.

### Section One - Front Timing Belt

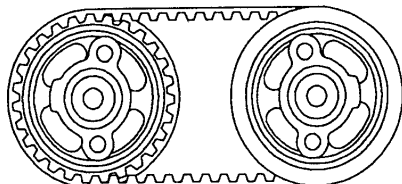
It will be necessary to raise and support the front of the vehicle and also support the engine.

Remove the right-hand front wheel, slash guard and rear cover of L-H cylinder bank (to view camshaft position).

#### Crankshaft Position

The crankshaft timing position is established by turning the crankshaft in a **clockwise** direction to -

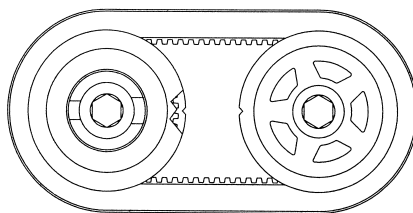
**825** - achieve position 60° BTDC and checking that the hubs of the rear camshaft sprockets (L-H bank) are positioned as the illustration below.



825

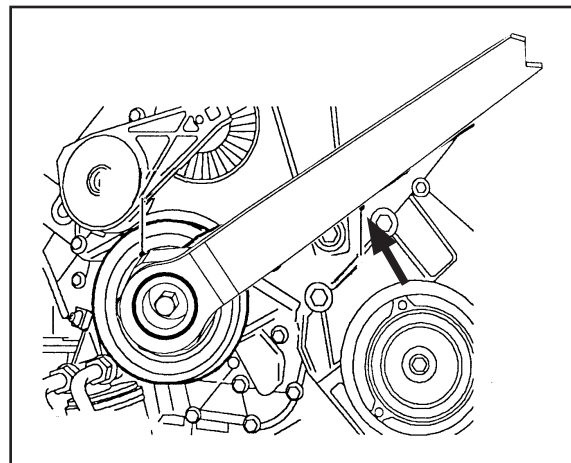
Then insert AS4604 Crankshaft Locking Pin through the hole located in the lower crankcase under L-H cylinders to 'lock' the crankshaft.

**45/75/L-R Freelander** - align the white mark on the crank pulley with the 'SAFE' arrow timing mark on the mounting plate, check that the timing marks on the rear camshaft sprockets (L-H bank) are aligned as the illustration below



**475/75/L-R Freelander**

It will be necessary to remove belt covers, auxiliary belt/tensioner, alternator, PAS pump (move sideways, do not disconnect hoses), AC compressor, mounting bracket etc., and drain engine oil. On automatic transmission also remove dipstick



### AS4614 Crankshaft Pulley Holding Tool - Associated Tool, not in kits

The crankshaft pulley must be removed in order to remove front timing belt on **45, 75 and L-R Freelander** - Use AS4614 Tool to counter-hold the pulley whilst releasing the centre bolt.

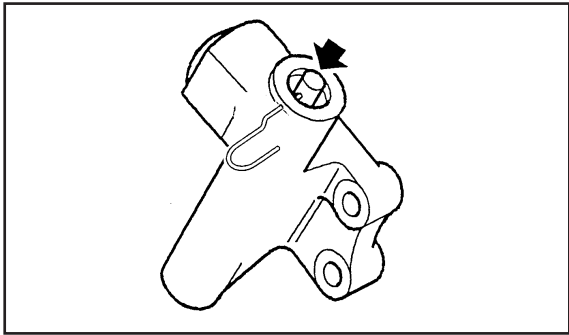
AS4614 must also be used when installing the pulley.

### Tensioner

**45/75/L-R Freelander** - remove the rubber blanking plug from around the tensioner

The timing belt tensioner is turned clockwise to release tension and is then removed.

**WARNING:** Do not loosen the allen screw which holds the tensioner pulley.



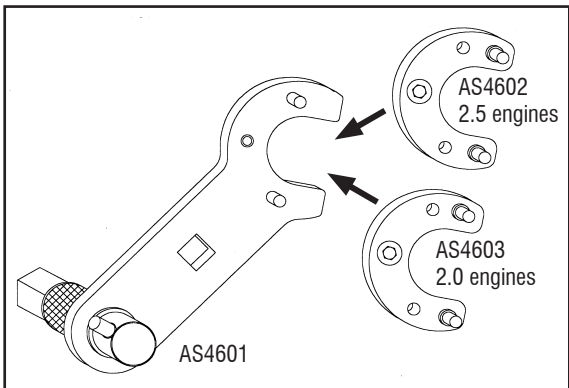
### AS4360T1 Tensioner Locking Pin

Using a vice, carefully compress the tensioner plunger until the holes in the body and plunger align, and insert AS4360T1 Pin to keep plunger depressed.

Remove the front timing belt.

**WARNING:** Do NOT rotate the crankshaft with the timing belt removed.

Remove the front oil seals from both exhaust camshafts.



Camshaft Locking Tools Assembly

### AS4601 Camshaft Locking Tools

used with

**AS4602 Camshaft Locking Adaptors - 2.5 engines**

or

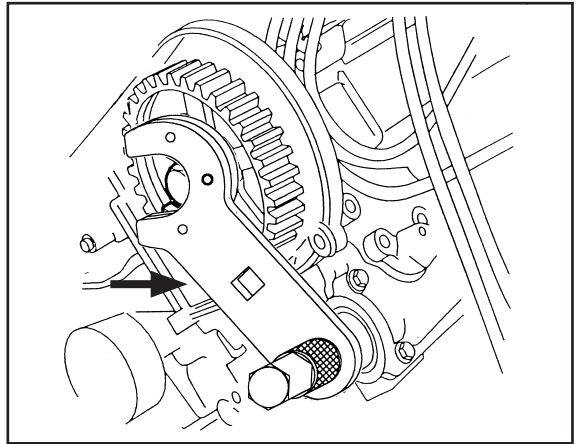
**AS4603 Camshaft Locking Adaptors- 2.0 engines**

The appropriate Adaptor AS4602 (2.5 engine) or AS4603 (2.0 engine) is selected and fixed onto AS4601 Locking Tool to make a Locking Tool Assembly.

These Locking Tool Assemblies are used to 'lock' the camshafts whilst the front sprocket bolts are released or tightened.

**NOTE:** Two AS4601/02 or /03 Assemblies are required, one for each front camshaft sprocket.

To 'lock' the camshaft the 'pegs' of the Camshaft Locking Adaptor are inserted into the front sprocket hub and the Locking Tool spindle is inserted into the end of the **exhaust** camshaft (location pin into slot in camshaft).



**NOTE:** Once the 'pegs' have been inserted it can be difficult to align the spindle for insertion into the end of the camshaft. Use of a drivebar in the square drive hole provided in the Locking Tool, will assist alignment.

**WARNING:** Damage to camshafts can result if an attempt is made to release or tighten sprocket bolts without these tools being installed.

Remove and discard sprocket bolts and remove Locking Tools

Remove front sprockets complete with hub assemblies.

Clean the sprockets and hubs and assemble back onto the camshafts. Screw in new sprocket bolts to fingertight allowing the sprockets to turn freely but not to tilt.

The AS4601/02 or /03 Camshaft Locking Tool Assemblies are now refitted, however as the new belt will not pass over these tools once they are installed, fit the new belt temporarily in position prior to fitting the tools.

Fit both of the AT4601/02 or /03 Tool Assemblies to the front camshaft sprocket hubs and into the ends of the exhaust camshafts.

Turn the sprockets **fully** clockwise and commence fitting the new timing belt in an **anti-clockwise direction** starting at the crankshaft gear.

**WARNING:** When fitting the belt over the front camshaft sprockets turn each sprocket only the minimum amount required to fit the belt into the sprocket teeth.

Turn the tensioner **clockwise** to rest against the belt and install the tensioner unit, applying Loctite to the bolt threads.

Remove AS4360T1 Locking Pin to release the tensioner plunger.

**45/75/L-R Freelander** - Re-fit rubber blanking plug around tensioner.

With the AS4601/02 or /03 Locking Tool Assemblies in place, tighten the sprocket bolts to 27Nm + 90°.

Remove both Camshaft Locking Tool Assemblies and

**825** - Remove AS4604 Crankshaft Locking Pin

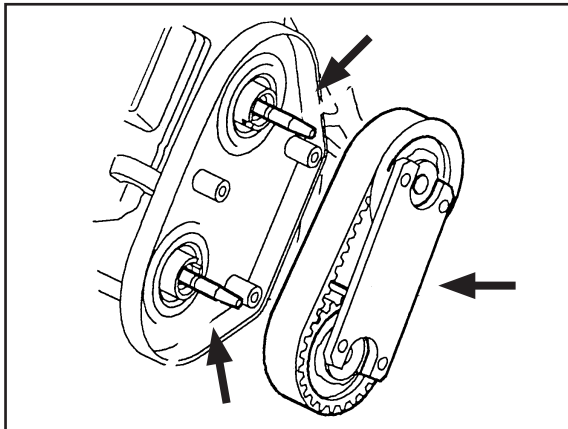
Re-assemble engine components.





## Section Two - Rear Camshaft Belts

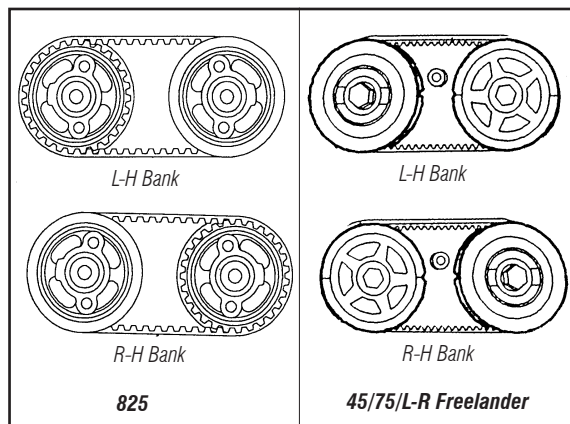
**IMPORTANT:** The rear camshaft belt replacement procedure applies to both the right-hand and left-hand belts, however replacement should be carried out only on one belt at a time.



Setting Tool and Guide Pins

Replacing a rear camshaft belt involves the removal of the bank of two cam sprockets complete with existing belt, as an assembly, whilst using a Setting Tool to maintain the relevant position and distance between the two sprockets. Then, on the workbench, a new belt is fitted over the two sprockets which are spread apart to tension the belt and the Setting Tool re-fitted. Guide Pins are used to assist installation of the whole assembly back onto the camshafts.

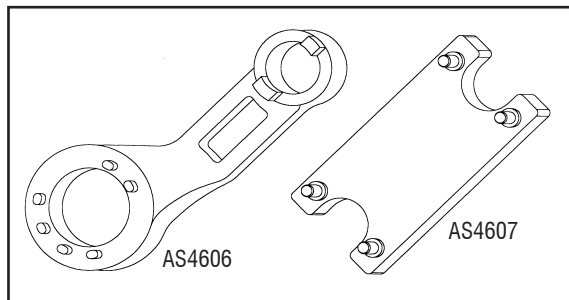
It will be necessary to raise and support the vehicle and to remove R-H front wheel, splash guard, timing covers, air filter, inlet manifold (upper), and rear engine bracket.



Turn the crankshaft in a clockwise direction to

**825** - position the rear cam sprockets to be able to fit Setting Tool AS4607 - see above illustration

**45/75/L-R Freelander** - align white timing marks on crank pulley and 'SAFE' arrow on mounting plate and to align timing marks on rear sprockets - see above illustration



### AS4606 and AS4607 Rear Cam Sprocket

#### Setting Tools

**AS4606** - for Rover 45/75 & L-R Freelander

**AS4607** - for Rover 825

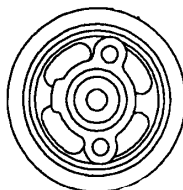
Dependant upon the model/engine, fit either AS4606 or AS4607 Setting Tool to the rear cam sprockets

**NOTE:** Setting Tools must be fitted to sprockets using hand pressure only.

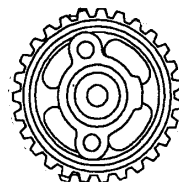
Release, remove and discard the sprocket bolts and remove the sprockets, existing belt and Setting Tool as an assembly, from the engine.

On the workbench, remove the belt from the sprockets and clean the sprockets and hubs.

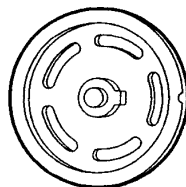
Assemble the hubs to the sprockets and place them on a flat surface ready to reconstruct the assembly for re-fitting to the engine.



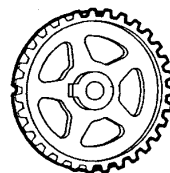
825



**825** - Place the sprockets as above illustration noting flanged edges and position/alignment of centre hubs

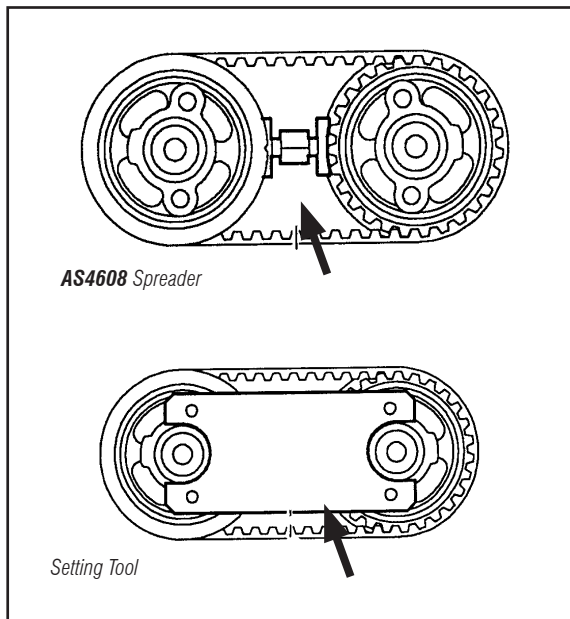


45/75/L-R Freelander



**45/75/L-R Freelander** - Place sprockets as above illustration noting position of locating lugs and timing marks.

Fit new belt around sprockets.



### AST4608 Rear Cam Sprockets Spreader

Fit AS4608 Sprocket Spreader between the sprockets and turn its centre screw to expand the distance between the sprockets to a position where AS4606 or AS4607 Setting Tool (dependant upon engine), can be inserted to re-make the assembly ready to install on the engine.

**NOTE:** Setting Tools must be fitted to sprockets using hand pressure only.

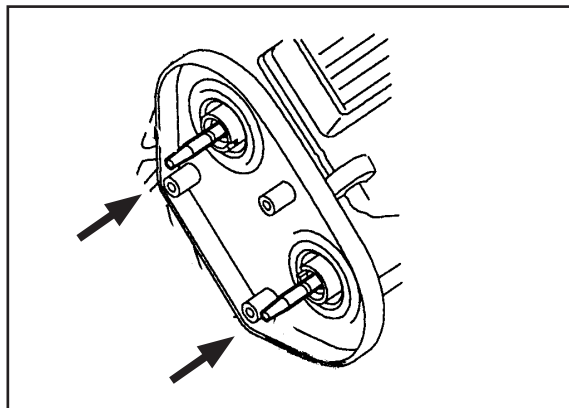
Remove the AS4608 Spreader.

### Refitting rear cam sprockets

Some alignment of the exhaust camshaft will be required when installing the rear cam sprocket/belt assembly, and therefore it is necessary to remove and discard the oil seals from the **front** of the exhaust camshafts in order to fit AS4601 Locking Tools.

Exhaust camshaft alignment is achieved by fitting the Spindle of AS4601 Locking Tool into the front of the exhaust camshaft (location pin into slot in camshaft) and using it to carefully turn the camshaft to align the drive slot in the camshaft rear to match the rear sprockets during their installation.

**NOTE:** For this alignment application the 'pegs' of the Locking Tool Assembly are not located into the camshaft sprocket hubs. Only the spindle of AS4601 is used.



### AS4609 Rear Cam Sprocket Guide Pin (2 required)

AS4609 Guide Pins are fitted into the rear ends of each camshaft to help install the rear cam sprocket/belt assembly onto the ends of the camshafts.

Slide the assembly over the Guide Pins.

Once the cam sprocket/belt assembly is installed, remove the AS4609 Guide Pins and fit new sprocket bolts.

Tighten sprocket bolts to 25Nm. + 90°.

Remove the AS4606 or AS4607 Setting Tool from the rear cam sprockets and AS4601 from the front of the exhaust camshaft. Fit new oil seal.

### More AST Timing Tools for Rover / Land Rover

Engine Setting/Locking Tool Kit - Rover Twin Cam Petrol & L Series Diesels –	see <b>AS4386</b>
Diesel Engine Setting/Locking Tool Kit - Rover /Land Rover 2.0d (BMW) –	see <b>AS4555</b>
Diesel Engine Setting/Locking Tool Kit - Land Rover 2.5D/200/300Tdi –	see <b>AS3243</b>
Diesel Engine Setting/Locking Tool Kit - Land Rover 2.5td (BMW) –	see <b>AS4411</b>

